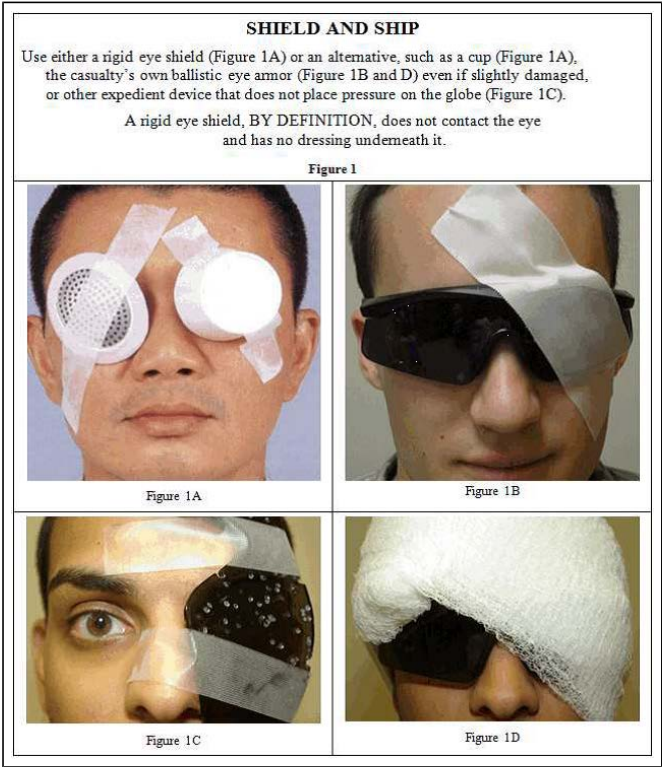


Ocular Ultrasound Use by Non-Ophthalmologists in Trauma

Because ocular injury requires expert care and treatment by an ophthalmologist exclusively, the primary role of the non-ophthalmologist is to suspect and identify an ocular injury that requires further care and to expedite transfer, minimizing added trauma along the way. Two fundamental principles in the assessment and management of a suspected open globe (i.e., rupture, perforation or penetration, or intraocular/orbital foreign body) are to (1) always avoid placing pressure on the eye, to include protecting the eye from further potential injury by applying a rigid eye shield; and (2) avoid the application of ointment or drops to the eye.

Ophthalmic literature, guidance and policy unequivocally provide evidence based support for these principles, and form the basis of current Joint Trauma System Clinical Practice Guidelines (CPG) and Tactical Combat Casualty Care Guidelines (TCCC Guidelines) recommendations.^{1,2,3,4} In short, “Shield and Ship”, even solely on the basis of suspicion of ocular injury.

At the same time, bedside ultrasound (US) has been widely adopted by the medical community as a valuable non-invasive assessment and diagnostic tool, especially in emergency and trauma cases. The FAST exam (Focused Assessment with Sonography in Trauma) has dramatically improved trauma diagnosis and greatly reduced the need for invasive exploratory procedures. Ultrasound has also been applied to ocular diagnosis in Emergency Department settings, most commonly for non-trauma conditions such as retinal detachment. While direct physical examination of the eye remains vastly superior to any indirect evaluation, in select non-trauma settings the use of adjunctive US can be warranted and poses little threat to the overall health of the eye prior to evaluation and treatment by the ophthalmologist. In contrast, the use of US by non-ophthalmologists for evaluating ocular trauma should be avoided, particularly when the eye cannot be examined directly, such as if there is acute swelling and hemorrhage of the ocular and periocular tissues. These manifestations often signal the presence of an open globe injury and attempts to perform US evaluation, particularly if performed without sedation or general anesthesia, will invariably result in placing pressure on the globe, potentially resulting in extrusion of the ocular contents while in pursuit of simply determining if the patient requires transfer (that answer is almost always “Yes”). Indeed, even ophthalmologists refrain from performing US on known or potential open globes, usually opting for non-contact imaging by CT and controlled direct examination under anesthesia (EUA), where diagnosis is concomitantly attended by surgical repair. In ophthalmic hands, US is performed only after the globe is closed. Given this information, all ocular trauma cases in which the eye cannot be examined directly should be shielded and promptly referred to an ophthalmologist for evaluation and management, particularly if there is a suspicion of open globe; ocular US should not be performed since it poses significant hazard to the eye and contributes little to the ultimate decision for the need for evacuation. If imaging is required, thin-slice or spiral axial CT is preferred, as it provides superior information, has greater specificity and sensitivity, can be reformatted



into coronal views, and is truly “noncontact”.

While availability of CT is clearly a limiting factor, nevertheless, US should not be considered an acceptable replacement. In recognition of the potential for applying inadvertent pressure on an open globe, techniques have been advocated that purportedly provide “noncontact” US capability, even in the face of ocular trauma. These techniques involve the application of a thick layer of US jelly over the lids, thereby acting as a fluid stand-off barrier to theoretically minimize contact and pressure; however, there is little experimental literature to support this claim. Furthermore, this technique contradicts the previously stated Tenet #2 of not applying ointment to open globes, as the jelly can seep between traumatized lids. This is of significant concern because US jellies are neither sterile nor formulated for the eye, and can therefore be extremely toxic to the internal eye. Moreover, clear gels can be exceptionally difficult to distinguish from intraocular contents (e.g., vitreous) when wiping off, and colored gels add other concerns for toxicity. Some advocate placing a protective plastic barrier over the eye, such as Opsite®, to prevent internal seepage but this violates Tenet #1: Do not put pressure on the eye.

In summary, “Shield and Ship” all suspected ocular trauma promptly to ophthalmology, without ultrasound.

References

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